



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,881	01/18/2006	Kozo Takatsu	274437US0PCT	1795
22850	7590	04/16/2008		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER SINGH, PREM C	
			ART UNIT	PAPER NUMBER
			1797	
			NOTIFICATION DATE	DELIVERY MODE
			04/16/2008	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com  
oblonpat@oblon.com  
jgardner@oblon.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/540,881	<b>Applicant(s)</b> TAKATSU ET AL.	
	<b>Examiner</b> PREM C. SINGH	<b>Art Unit</b> 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Amendment to claims 1, 3, 4, and 6 -15, and cancellation of claim 5 is noted.  
  
New abstract is noted.  
  
Rejection of claims 1-3 and 6-15 under 35 USC 102 (b) is withdrawn. New rejection follows.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:
  1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-4 and 6-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takashi et al (Japanese Patent Abstract No: 2001-278602) in view of Satokawa et al (US 2001/0014304 A1).

6. With respect to claim 1, Takashi discloses removal of sulfur compounds from a petroleum system hydrocarbon feed by first contacting the feed with a first adsorbent (it is to be noted that Takashi uses the term “devulcanizing agent” for desulfurization agent) to remove benzothiophenes or dibenzothiophenes and then with a second adsorbent to remove mercaptans, thiophenes, dibenzothiophenes, sulfides, and disulfides (See paragraph 0004 and 0005). Takashi further discloses silica, alumina, silica-alumina, zeolite, titania, zirconia, magnesia, zinc oxide, clay, diatomaceous earth etc. as desulfurizing agent supports. Takashi also discloses that the supports may be used independently or as combinations of two or more (See paragraph 0008). Takashi

Art Unit: 1797

discloses LPG, gasoline, naphtha, kerosene, and gas oil as the preferred petroleum system hydrocarbons (See paragraph 0008). Takashi also discloses that the second adsorbent could be hydrodesulfurization catalysts such as Co-Mo/Alumina and Ni-Mo/Alumina (See paragraph 0010).

It is to be noted that Takashi invention uses zeolite as the desulfurizing agent A and Co-Mo/Alumina as the second desulfurizing agent B. It is also to be noted that Co-Mo/Alumina is metal oxide/metal component-carried oxide.

Takashi invention discloses use of zeolite but does not specifically disclose using claimed metals, alkali metals, alkaline earth metals, and rare earth metals with zeolite

Satokawa invention discloses a process for desulfurization of hydrocarbon feed similar to Takashi under similar operating conditions using zeolites (See page 2, paragraph 0023). Satokawa also discloses that by using one or more transition metals selected from silver, copper, zinc, iron, cobalt, and nickel supported on zeolite improves the adsorption characteristics of sulfur compounds in fuel gas (See page 3, paragraph 0030 and 0032).

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Takashi invention and use the transition metal supported zeolite as the desulfurizing agent A as disclosed by Satokawa for an improved desulfurization.

7. With respect to claim 2, Takashi does not specifically disclose that the desulfurizing agent A has higher desulfurizing performance to sulfides and disulfides

Art Unit: 1797

than desulfurizing agent B and desulfurizing agent B has a higher desulfurizing performance to carbonyl sulfide than that of desulfurizing agent A. However, Takashi uses desulfurizing agents similar to the Applicant's claim. Thus, Takashi invention should necessarily be having similar performance of desulfurizing agents A and B as claimed.

8. With respect to claim 3, Takashi invention discloses desulfurizing agent to be 40-80% of the total quantity of desulfurizing agents (A and B) (See paragraph 0010).

9. With respect to claim 4, Satokawa invention discloses using Y- and beta-zeolites (See page 2, paragraph 0023)..

10. With respect to claim 6, Takashi invention discloses metal components Ni, Co, and Mo in desulfurizing agent B (See paragraph 0010).

11. With respect to claim 7, Takashi invention discloses temperature of the desulfurizing bed to be from -40 to 100°C (See paragraph 0009).

12. With respect to claims 8 and 9, Takashi invention discloses LPG and naphtha fraction as hydrocarbon containing gas for fuel cell (See paragraph 0008).

Takashi invention does not specifically disclose LPG and naphtha containing less than 0.1 weight ppm carbonyl sulfide. However, the invention does disclose that total

Art Unit: 1797

sulfur content must be below 0.2 weight ppm (See paragraph 0002). Since Takashi's disclosure of total sulfur content includes mercaptans, thiophenes, benzothiophenes, dibenzothiophenes, sulfides, and disulfides (See paragraph 0005), it includes carbonyl sulfide also. When the concentration of all sulfur compounds is below 0.2 weight ppm, clearly, the concentration of carbonyl sulfide must be below 0.1 weight ppm.

13. With respect to claim 10, Takashi invention discloses desulfurization of LPG and naphtha fraction by using a desulfurizing agent comprising a zeolite (See paragraph 0008).

14. With respect to claims 11 and 14, Takashi invention discloses a process for producing hydrogen for a fuel cell by contacting the petroleum system hydrocarbon (LPG, gasoline, naphtha, kerosene) after conducting the desulfurization process of the invention, with a steam reforming catalyst (See paragraph 0012).

15. With respect to claims 12 and 15, Takashi invention discloses using ruthenium base or nickel base catalyst for steam reforming (See paragraph 0012).

16. With respect to claim 13, Takashi invention discloses using LPG and naphtha fraction as hydrocarbon containing gas for fuel cell (See paragraph 0008).

***Response to Arguments***

17. Applicant's arguments filed 02/26/2008 have been fully considered but they are not persuasive.

18. The Applicant's argument regarding rejection of claims 1-3 and 6-15 under 35 USC 102 (b) is moot, in view of the new rejection under 35 USC 103(a), necessitated due to amendment to the claims.

19. The Applicant argues regarding claim 8 and subsequent dependent claims, Takashi is silent with respect to Carbonyl sulfide. Applicants have stated in the specification, the problems associated with conventional methods of removal of this material and therefore, Takashi does not disclose or suggest such a hydrocarbon-containing gas for a fuel cell.

The Applicant's argument is not persuasive because Takashi invention does disclose that total sulfur content must be below 0.2 weight ppm (See paragraph 0002). Since Takashi's disclosure of total sulfur content includes mercaptans, thiophenes, benzothiophenes, dibenzothiophenes, sulfides, and disulfides (See paragraph 0005), it should necessarily include carbonyl sulfide also. When the concentration of all sulfur compounds is below 0.2 weight ppm, the concentration of carbonyl sulfide must be below 0.1 weight ppm. It is to be noted that Takashi is taking the desulfurized hydrocarbon stream subsequently for hydrogen production for fuel cells (See paragraph



0001). Thus, the stream must be desulfurized to meet proper specifications of sulfur content (See paragraph 0002).

20. The Applicant argues that neither Takashi nor Satokawa discloses or suggests the significant improvement in performance achieved according to the method of the claimed invention and demonstrated in Table 1 of the Specification.

The Applicant's argument is not persuasive because the combined teachings of Takashi and Satokawa inventions disclose each and every limitation of the claimed invention. Thus, the improvement demonstrated in Table 1 of the Applicant's Specifications, will inherently be expected from Takashi and Satokawa.

### ***Conclusion***

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

Art Unit: 1797

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Glenn A Caldarola/  
Acting SPE of Art Unit 1797

PS040608

Application/Control Number: 10/540,881  
Art Unit: 1797

Page 10